

WHAT IS CLAIMED IS:

1. A method for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, comprising:
 - detecting the inter-vehicle distance;
 - photographing a video image of a vehicular forwarding zone;
 - detecting a plurality of edges including at least a part of the preceding vehicle from the photographed video image;
 - detecting an inter-edge spacing of mutually opposing edges from the detected video image; and
 - calculating a present inter-vehicle distance of the vehicle to the preceding vehicle at a present time point from a previous inter-vehicle distance calculated thereby at a previous time point at which the inter-edge spacing of the mutually opposing edges has previously been detected and the inter-edge spacings at the previous time point and at the present time point.
2. A method for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, as claimed in claim 1, wherein the mutually opposing edges are one of longitudinally opposing edges with respect to an image screen and laterally opposing edges with respect thereto whose average gray level is larger than the other.
3. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein when detecting the mutually opposing edges on the video image, detecting new edges at an outside of a predetermined

range of a previous video image previously photographed, within the predetermined range of which the mutually opposing edges whose inter-edge spacing is to be detected are present.

5

4. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein, when calculating the present inter-vehicle distance, starting a calculation on the present inter-vehicle distance to the preceding vehicle from a time point at which the detected inter-vehicle distance falls within a predetermined range of distance, the predetermined range being modified according to a vehicular running state.

5. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 4, wherein the vehicular running state is a vehicular velocity.

6. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein when detecting the inter-edge spacing of the detected mutually opposing edges, detecting the inter-edge spacing between the mutually opposing edges of one of longitudinally opposing edges or laterally opposing edges detected on the photographed video image whose detected number is less than the other.

7. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein when detecting the inter-edge spacing between the vertical edges detected within the image when the detected inter-vehicle distance is longer than a predetermined distance or the interval of edges detected on the

8. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein when detecting the mutually opposing edges and a vehicular velocity is higher than a predetermined vehicular velocity, detecting the inter-edge spacing of the laterally opposing edges detected on the photographed video image.

15

10. A method for estimating an inter-vehicle distance for an automotive vehicle as claimed in claim 1, wherein when detecting the mutually opposing edges, one of the inter-edge spacings of longitudinally opposing edges and horizontally opposing edges whose magnitude is wider than

20 the other is selected.

an inter-vehicle distance detecting section that detects the inter-vehicle distance;

an edge detecting section that detects a plurality of edges including at least a part of the preceding vehicle from the photographed wide image by the photographing device and detects an inter-edge spacing of mutually opposing edges

from the detected image; and

an inter-vehicle distance calculating section that calculates a present inter-vehicle distance from the vehicle to the preceding vehicle at a present time point
5 fro a previous inter-vehicle distance calculated thereby at a previous time point at which the inter-edge spacing of the mutually opposing edges has previously been detected and the inter-edge spacings at the previous time point and at the present time point.

10

12. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, as claimed in claim 11, wherein the edge detecting section comprises a new edge
15 detecting section that detects new edges at an outside of a predetermined range of a previous video image previously photographed by the photographing device within the predetermined range of which the mutually opposing edges whose inter-edge spacing is to be detected are present.

20

13. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, as claimed in claim 11, wherein the inter-vehicle distance calculating section
25 starts the calculation of the inter-vehicle distance when the inter-vehicle distance detected by the inter-vehicle distance detecting section falls within a predetermined range of distance and comprises a predetermined range modifying section that modifies the predetermined range
30 of distance according to a running state of the vehicle.

14. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle

which is running ahead of the vehicle, as claimed in claim 13, wherein the running state of the vehicle is a vehicular velocity.

5 15. An apparatus for estimating an inter-vehicle
distance of an automotive vehicle to a preceding vehicle
which is running ahead of the vehicle, as claimed in claim
11, wherein the edges to be detected by the edge detecting
10 section are one of vertical edges and horizontal edges and
wherein the edge detecting section detects the inter-edge
spacing of the mutually opposing edges from one of the
vertical edges and horizontal edges detected on the video
image photographed by the photographing device whose
15 detected number is less than the other.

16. An apparatus for estimating an inter-vehicle
distance of an automotive vehicle to a preceding vehicle
which is running ahead of the vehicle, as claimed in claim
11, wherein the edges to be detected by the edge detecting
20 section are one of vertical edges and horizontal edges and
wherein the edge detecting section comprises a horizontal
edge inter-edge spacing detecting section that detects the
inter-edge spacing of the horizontal mutually opposing
edges detected on the video image photographed by the
25 photographing device when the inter-vehicle distance
detected by the inter-vehicle distance detecting section
is longer than a predetermined inter-vehicle distance or
when the inter-edge spacing between the mutually opposing
edges is wider than a predetermined inter-edge spacing.

30 17. An apparatus for estimating an inter-vehicle
distance of an automotive vehicle to a preceding vehicle
which is running ahead of the vehicle, as claimed in claim

11, wherein the edges to be detected by the edge detecting section are one of vertical edges and horizontal edges and wherein the edge detecting section detects the inter-edge spacing between the vertically opposing edges when the inter-vehicle distance detected by the inter-vehicle distance detecting section is longer than a predetermined inter-vehicle distance or when the inter-edge spacing between the mutually opposing edges is narrower than a predetermined inter-edge spacing.

18. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, as claimed in claim 11, wherein the edges to be detected by the edge detecting section are one of vertical edges and horizontal edges and wherein the edge detecting section detects the inter-edge spacing between the horizontally opposing edges detected on the video image photographed by the photographing device when a vehicular velocity of the vehicle is higher than a predetermined vehicular velocity.

19. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle which is running ahead of the vehicle, as claimed in claim 11, wherein the edges to be detected by the edge detecting section are one of vertical edges and horizontal edges and wherein the edge detecting section detects the inter-edge spacing between the horizontally opposing edges detected on the video image photographed by the photographing device when the vehicle is turning.

20. An apparatus for estimating an inter-vehicle distance of an automotive vehicle to a preceding vehicle

5

10

15

detecting the inter-vehicle distance;

20

25

30

at the present time point.

5

10

15

20

25

30